

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (Currently Amended): An adaptive array antenna receiving apparatus which receives a CDMA transmitted signal by a plurality of antenna elements forming an adaptive array antenna and which includes a plurality of fingers for receiving a multipath signal, said receiving apparatus comprising:

a plurality of despreading means forming said fingers, respectively each of said despreading means being connected to said antenna elements and supplied with received signals from said antenna elements for despreading the received signals to produce despread signals;

a plurality of weighting factor multiplying means also forming said fingers, respectively, and supplied with the despread signals from said despreading means, respectively, each of said weighting factor multiplying means multiplying the despread signals by weighting factors calculated for said antenna elements to produce a weighted signal for a corresponding one of said fingers;

combining means for combining the weighted signals, supplied from said weighting factor multiplying means to produce a rake combined signal;

error signal producing means supplied with the rake combined signal and a reference signal for calculating a difference between the rake combined signal and the reference signal to produce a common error signal representative of the difference; and

a plurality of antenna weight control means also forming said fingers, respectively, and supplied with the despread signals from said despreading means included in corresponding ones of said fingers, respectively, and with the common error signal in common and connected to said weighting factor multiplying means included in corresponding ones of said fingers, each of said antenna weight control means being for controlling the weighting factors for each of said weighting factor multiplying means so that a mean square of the common error signal is minimized, wherein each of said antenna weight control means controls the weighting factors for each of said weighting factor multiplying means by using an N-order, where N is greater than or equal to two, correlation matrix as an adaptive update algorithm, wherein there are N antenna elements, and

wherein the incoming direction of the path is obtained from the N-order, where N is greater than or equal to two, correlation matrix as an adaptive update algorithm.

2. (Previously presented): An adaptive array antenna receiving apparatus as claimed in claim 1, wherein an RLS (Recursive Least Square) algorithm is used as an adaptive update algorithm.

3. (Canceled).

4. (Previously presented): An adaptive array antenna receiving apparatus as claimed in claim 1, wherein

said reference signal is a signal equivalent to a known pilot signal and each of the received signals is the known pilot signal; and

further comprising deciding means (11) for making a data decision upon the rake combined signal produced by said rake combining means to produce a decision output signal and switching means (12) for selectively switching the decision output signal produced by said deciding means and the reference signal, said switching means being controlled so that, when the received signal is the pilot signal and when the received signal is a data signal other than the pilot signal, the reference signal and the decision output signal are selected, respectively, to be supplied to said error signal producing means.

5-7. (Canceled).

8. (Previously presented): An adaptive array antenna receiving apparatus as claimed in claim 1, wherein each of said plurality of antenna weight control means uses an SMI (Sample Matrix Inversion) algorithm as an adaptive update algorithm for controlling the weighting factors.

9-10. (Canceled).

11. (Currently Amended): A receiving method for use in an adaptive array antenna receiving apparatus which receives a CDMA transmitted signal by a plurality of antenna

elements forming an adaptive array antenna and which includes a plurality of fingers for receiving a multipath signal, said receiving method comprising:

despreading steps carried out in said plurality fingers, respectively, each of said despreading steps being supplied with received signals from said antenna elements, for despreading the received signals to produce despread signals;

a plurality of weighting factor multiplying steps also forming said fingers, respectively supplied with the despread signals from said despreading steps, respectively, each of said plurality of weighting factor multiplying steps being for multiplying the despread signals by weighting factors calculated for said antenna elements to produce a weighted signal for corresponding one of said fingers;

a combining step for combining the weighted signals supplied from said weighting factor multiplying steps to produce a rake combined signal;

an error signal producing step supplied with the rake combined signal and a reference signal for calculating a difference between the rake combined signal and the reference signal to produce a common error signal representative of the difference; and

antenna weight control steps supplied with the despread signals from said despreading steps, respectively, and with the common error signal in common, each of said antenna weight control steps being for controlling the weighting factors for each of said weighting factor multiplying steps so that a mean square of the common error signal is minimized, wherein each of said antenna weight control steps has a means for using an N-order, where N is greater than or

equal to 2, correlation matrix as an adaptive update algorithm, where N is the number of antenna elements, and

wherein the incoming direction of the path is obtained from the N-order, where N is greater than or equal to two, correlation matrix as an adaptive update algorithm.

12. (Previously presented): A receiving method as claimed in claim 11, wherein each of said antenna weight control steps uses an RLS (Recursive Least Square) algorithm as an adaptive update algorithm for controlling the weighting factors for each of said first through said L-th weighting factor multiplying steps.

13. (Canceled).

14. (Previously presented): A receiving method as claimed in claim 11, wherein,
said reference signal is a signal equivalent to a known pilot signal and each of said received signal is the known pilot signal; and

further comprising a deciding step (11) for making a data decision upon the rake combined signal produced by said rake combining step to produce a decision output signal and a switching step (12) for selectively switching the decision output signal produced by said deciding step and the reference signal, said switching step being controlled so that, when the received signal is the pilot signal and when the received signal is a data signal other than the pilot

signal, the reference signal and the decision output signal are selected, respectively, to be supplied to said error signal producing step.

15-17. (Canceled).

18. (Previously presented): A receiving method as claimed in claim 11, wherein each of said antenna weight control steps uses an SMI (Sample Matrix Inversion) algorithm as an adaptive update algorithm for controlling the weighting factors.

19-20. (Canceled).